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Prediction of bronchopulmonary dysplasia development

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The survival of infants born extremely prematurely is increasing, but the incidence of bronchopulmonary dysplasia (BPD) is not diminishing.[1] Strategies employed to reduce the incidence of BPD have largely been unsuccessful or have an unacceptably high rate of adverse effects.[2] It is, therefore, essential to identify predictors of BPD development and in particular the development of severe BPD so that preventative interventions can be targeted at high risk infants. We tested the hypothesis that a requirement for invasive mechanical ventilation at one week of age would predict development of BPD and severe BPD.

Infants less than 32 weeks of gestational age ventilated at one week of age on the neonatal unit at King's College Hospital NHS Foundation Trust from September 2012 to August 2017 were identified using the Badger Neonatal EPR system (Clevermed, Edinburgh, UK). BPD was diagnosed as oxygen dependency greater than 28 days after birth. BPD severity was categorised according to the support required at 36 weeks post-menstrual age (PMA); those in room air were diagnosed as having mild BPD, those requiring less than 30% oxygen moderate BPD and those requiring positive pressure support or more than 30% oxygen as having severe BPD.

The outcomes of 454 infants were assessed; 22 infants died before 28 days and were excluded from the analysis. Hence, 432 infants were included in the analysis, 228 (53%) developed BPD. Of those who survived, 24% had mild BPD, 29% moderate BPD and 47% severe BPD. Of the 127 ventilated at one week of age, 126 developed BPD. Of those infants who were ventilated at one week, 6% had mild BPD, 27% had moderate BPD and 67% had severe BPD (Figure 1). Comparison of data from 2012-2013 to from 2016-2017 showed no significant change in the incidence of BPD ($p=0.4$) or severe BPD ($p=0.53$).

Requirement for mechanical ventilation at one week of age was 99% sensitive and 67% specific in predicting development of BPD and predicted severe BPD with 63% sensitivity and 92% specificity. Mechanical ventilation at one week gave areas under the receiver

operator characteristic curves for the development of BPD and severe BPD of 0.77 and 0.83 respectively. Use of invasive mechanical ventilation at one week of age as a predictor of the development of BPD, and in particular severe BPD, may facilitate counselling of parents and identifying the most appropriate candidates for future trials of therapeutic interventions to prevent BPD.

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FIGURE LEGEND

Figure 1: Flow diagram of infants included in the study

